Fig.1

Calculation
results
.xml

RCA models
.xml

Navigate to
the hypothesis

100
Load
calculation
results

200
Load the
checklist

300
Evaluate the
model-driven
checklist items

400
Identify the
evaluated
checklist items

Output the
checklist

⟶ Information flow
---→ Data access
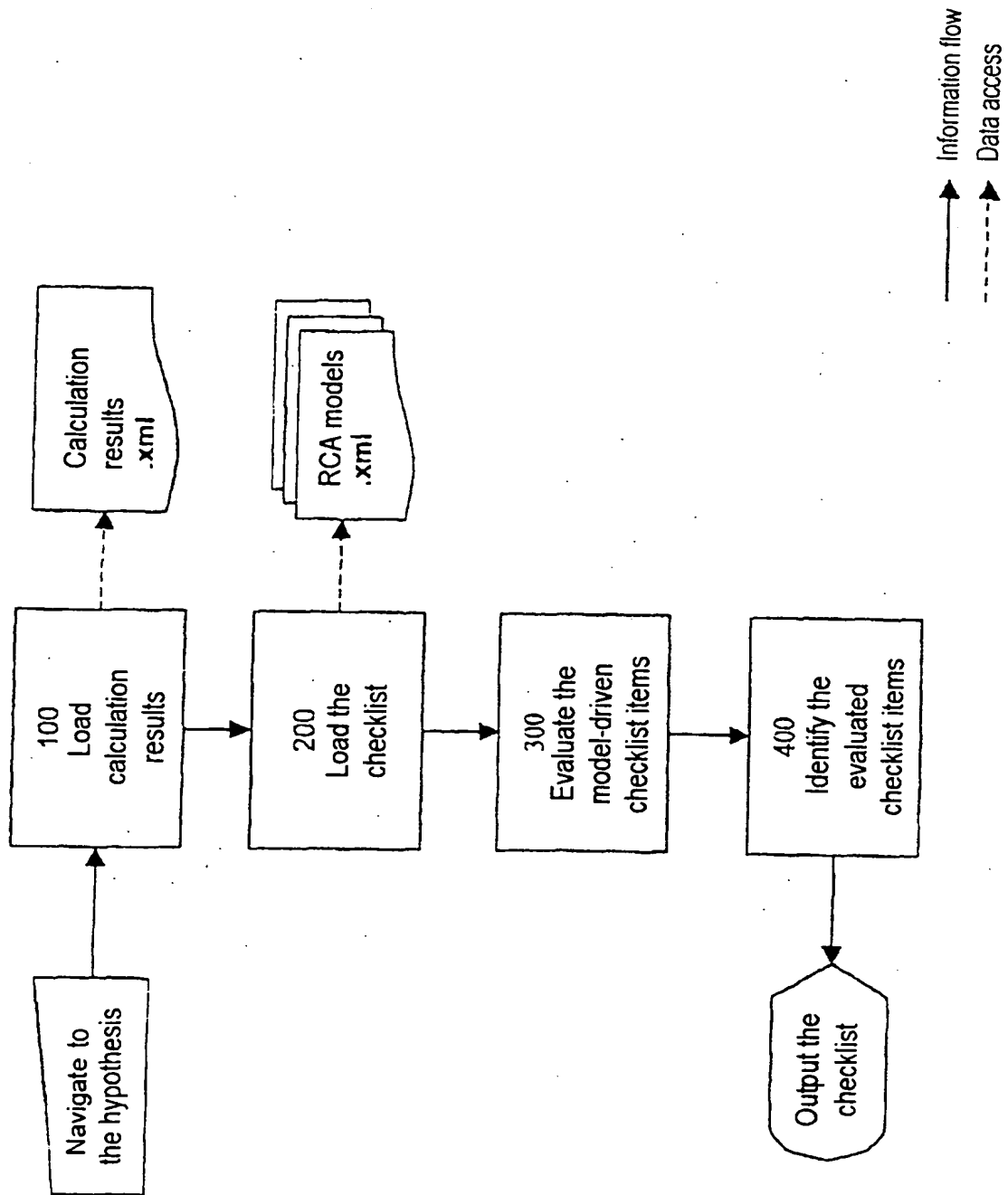
Fig. 2

$$\frac{dV}{dt} = F_i - F_0 + F_0 f_1(t)$$

$$\frac{dT}{dt} = \frac{F_i}{V}(T_i - T) - \frac{k_0}{\rho_0 C_p}\Delta H e^{\frac{E}{RT}}C_A - \frac{UA(T - T_{j,0})}{\rho_0 C_p V} + G(T, C_A)f_1(t)$$

$$\frac{dC_A}{dt} = \frac{F_i}{V}(C_{A,i} - C_A) - k_0 e^{\frac{E}{RT}}C_A + \frac{F_0}{V}f_2(t)$$

$$\frac{dT_{j,0}}{dt} = \frac{F_j}{V_j}(T_{c,i} - T_{j,0}) + \frac{UA}{\rho_j V_j C_j}(T - T_{j,0})$$

where

$$G(T, C_A) = \left[\frac{k_0}{\rho_0 C_p}\Delta H e^{\frac{E}{RT}}C_A + \frac{UA(T - T_{j,0})}{\rho_0 C_p V}\right]$$

Fig. 3

Process model
- Process steps

Fault events
- Critical components

Fault trees

Verification
checklists

Fig. 4

Fault event
Name
Description
Fault effect
Fault location
Diagnosis criterion

n fault hypotheses

Fault hypothesis
Name
Description
Fault location
Verification checklist
Diagnosis criterion
Diagnosis method
Diagnosis effort
Aids
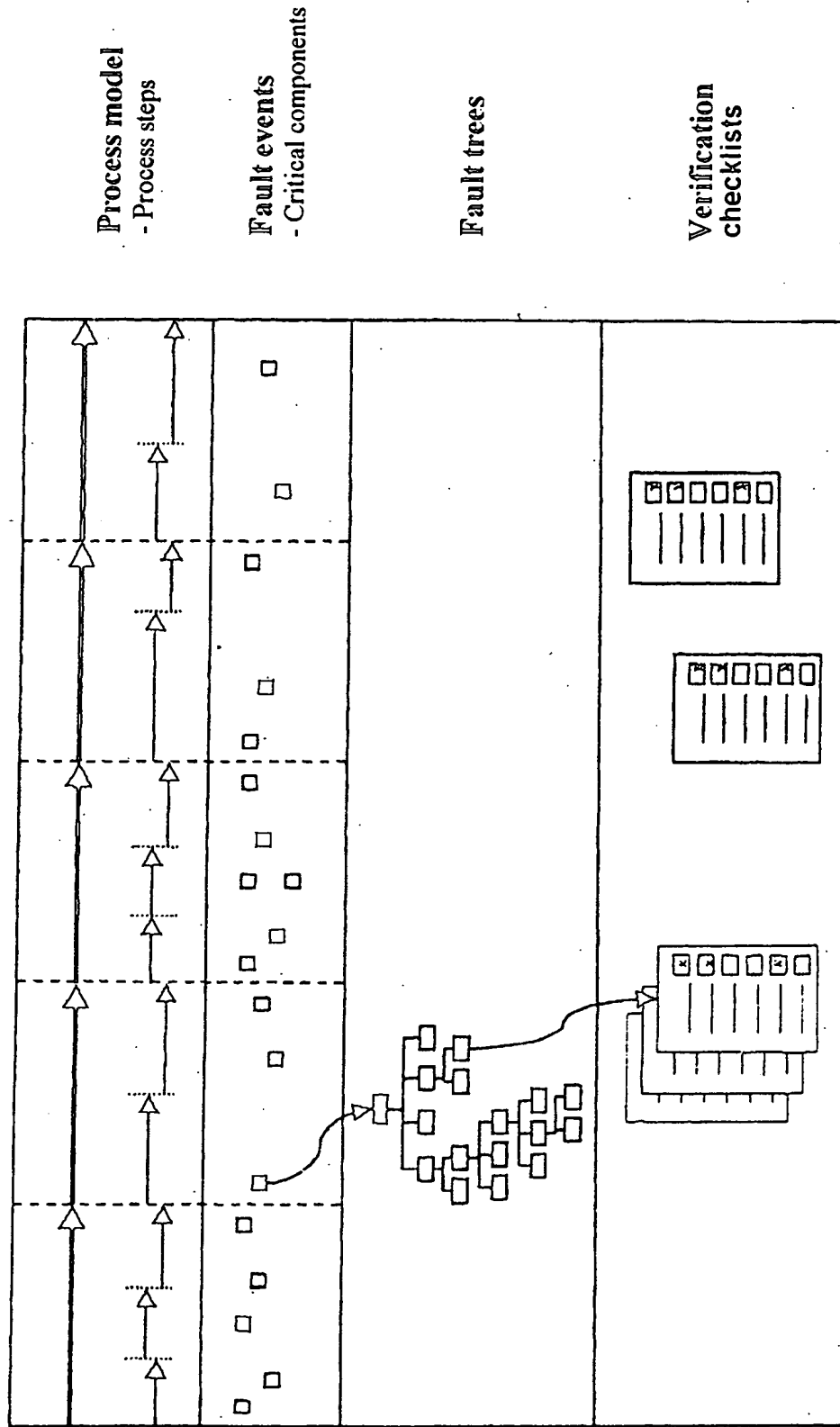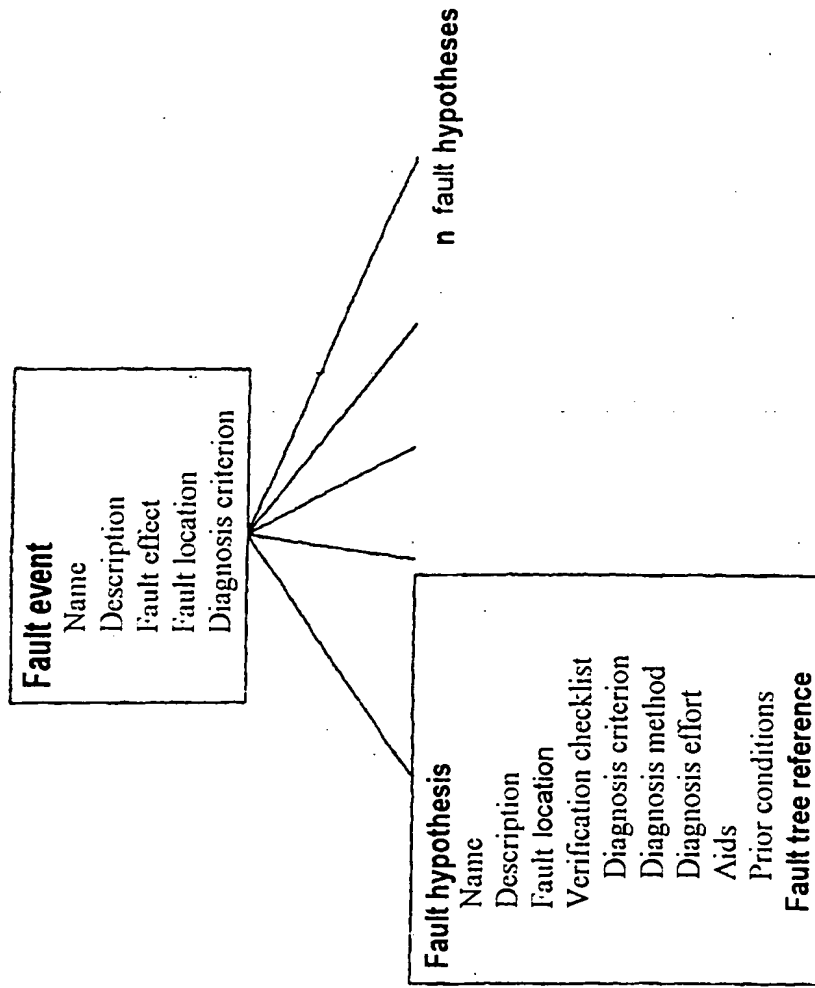Prior conditions
Fault tree reference

Fig. 5

Fault hypothesis – Power supply too high

Description
An overpressure in the reactor can be caused by an excessively high power supply.

Localization
Continuously stirring reactor XY

Verification checklist
    Valve not open?
        Diagnosis method: ...
        Diagnosis effort: low
    Temperature measurement fault?
        Diagnosis method: physical model
        Diagnosis effort: automatically verified
    Incorrect operating instructions?
        Diagnosis method: ...
        Diagnosis effort: average
    Leakage to the cooling casing?
        Diagnosis method: physical model
        Diagnosis effort: automatically verified

Fault tree reference
    Incorrect operating instructions

Fig. 6

Fault hypothesis – Power supply too high

Description
An overpressure in the reactor can be caused by an excessively high power supply.

Localization
Continuously stirring reactor XY

Verification checklist

Valve not open?
    Diagnosis method: ...
    Diagnosis effort: low
    Temperature measurement fault excluded!
    Diagnosis method: physical model
    Diagnosis effort: automatically verified

Incorrect operating instructions?
    Diagnosis method: ...
    Diagnosis effort: average

Leakage to the cooling casing!
    Diagnosis method: physical model
    Diagnosis effort: automatically verified

Fault tree reference
    Incorrect operating instructions

Fig. 7